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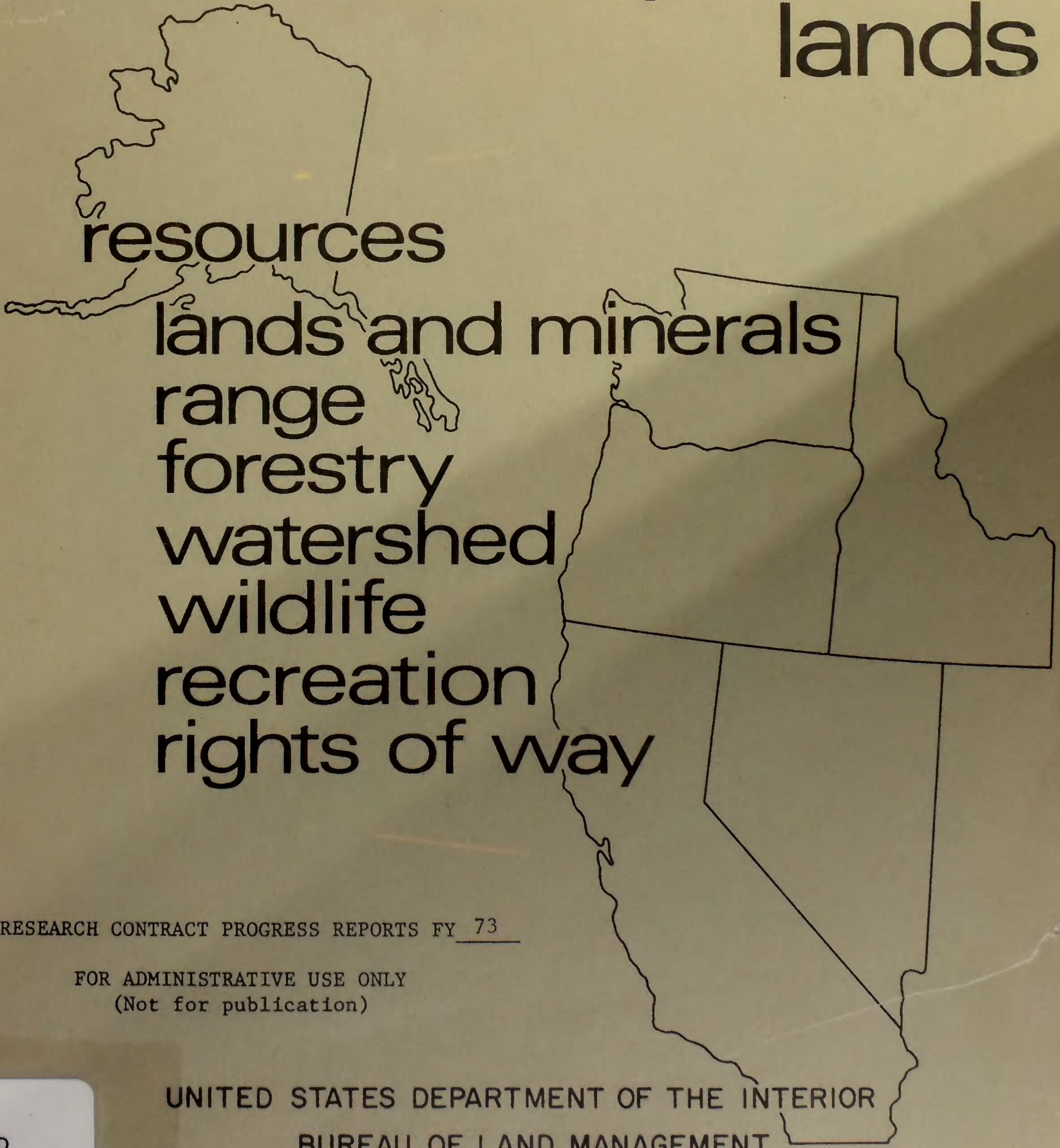

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RESEARCH CONTRACT PROGRESS REPORTS FY 73

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INTRODUCTION

These Annual Progress Reports present a resume of contractural accomplishments of the Portland Service Center for the reporting period July 1, 1972, to June 30, 1973.

The material presented was extracted from more detailed information which each COAR has available to him. Inquiries about specific projects should be directed to the State Office Representative or the COAR of each project.

These Progress Reports have been prepared primarily for administrative use, and many of the results are inconclusive; therefore, the information is not to be used for publication unless prior authorization from the Portland Service Center is obtained. All future Progress Reports will be compiled by the Denver Service Center.

BLM RESEARCH
PROGRESS REPORT 1973 F. Y.

I. Project Title and Contract Number:

White Spruce Silvicultural Study

Research Contract No. 53500-CT1-228(N)

II. Contractor:

Pacific Northwest Forest and Range Experiment Station

U. S. Forest Service

III. Project Location:

State - Alaska

District - Fairbanks

IV. Personnel:

BLM	1.	Service Center	K. Bergsvik
	2.	State Office	R. Smith
Contractor	1.	Project Leader	J. C. Zasada

V. Starting Date and Expected Completion Date:

July 1, 1970 - June 30, 1976 (tentative)

VI. Objective:

To test silvicultural systems and seedbed preparation methods for obtaining white spruce regeneration on upland and river bottom sites in Interior Alaska.

VII. Progress:

During fiscal year 1973 work on this project has involved completion of logging and site preparation on the Bonanza Creek Experimental Forest study site, instrumentation of the study site,

chemical analysis of soil samples collected prior to harvesting, collection of pre-treatment insect and small mammal data, and regeneration survey of five areas on sites similar to the Bonanza Creek site from which the white spruce was harvested 3-10 or more years ago.

For detailed information and a discussion of the implications of the results to date refer to Progress Report No. 2, April 4, 1973, prepared by J. C. Zasada.

VIII. Plans for next fiscal year:

In FY 74 first-year regeneration of white spruce and other important woody and herbaceous species which are potential competitors of white spruce will be monitored. Other biotic factors, such as insects, affecting regeneration and residual mortality and small mammals will be monitored and soil and organic matter analyzed. In addition to research at Bonanza Creek, several plots in river bottom white spruce forests will be established. As time permits, regeneration surveys on areas harvested during the last 10 years will continue to be carried out.

IX. Reports and Publications to date:

1. Zasada, John C., Progress Rept. #1 for BLM-USFS Cooperative White Spruce Regeneration Research, undated.
2. Zasada, John C., Guidelines for Obtaining Natural Regeneration of White Spruce in Alaska, PNWFRES, 1972.
3. Zasada, John C., Progress Report #2 for BLM-USFS Cooperative White Spruce Natural Regeneration Research, April 4, 1973.

BLM Research Progress Report
FY 1973

I. Title: Further Investigation of Correlations of Vegetation, Substrate, and Topography in Interior Alaska
53500-CT1-355(N)

II. Principal Investigator: Dr. Bonita J. Neiland, Professor of Botany and Head, Department of Land Resources and Agricultural Sciences, University of Alaska

III. Project Location: Alaska, Fairbanks District

IV. Personnel:	BLM	1.	Service Center	Robert D. Martin
		2.	State Office	Sal DeLeonardis
	Contractor	1.	The study will be conducted by a graduate degree candidate and under the supervision of Dr. Bonita J. Neiland, Professor of Botany, Department of Biological Sciences, and Head of the Dept. of Land Resources and Agri. Sciences, University of Alaska.	

V. Starting Date: June 1, 1971
Expected Completion Date: June 30, 1974

VI. Objectives:

A. To continue the study of vegetation, substrate conditions, and topography, and of the indicator value of vegetational groupings for such substrate conditions that was begun in 1971.

B. To widen the areal extent of the study to include sites away from Fairbanks in the vicinity of Healy and Tok, and (2) near Fairbanks on a lower south facing slope.

C. To continue the study of the feasibility of developing indices predictive of trafficability and use potential of given landscape types in Interior Alaska.

VII. Summary of the Project to Date:

A. Background.

Plans included locating contoured transects on north-facing and south facing slopes, and obtaining the following information along them: (1) description of major vegetation patterns

and species occurrence; (2) examination of substrate for depth of organic matter, texture and structure of mineral soil, depth to ground ice (if present) at time of maximum thaw, apparent gross moisture conditions, stoniness, etc.; (3) recording of exposure, slope angle, proximity to drainages, and amount of ground cover; and (4) fall and spring measurements of snow accumulation and melt patterns. Compilation of a bibliography of pertinent literature was included.

B. Accomplishments to date:

1. Literature Search.

During FY 1973, a bibliography was compiled of all possibly pertinent literature and review of this was begun.

2. Transects.

In 1971, two transects were run on a north-facing slope covered by black spruce-Sphagnum vegetational complexes in the Caribou-Poker Creeks Research Watershed. These were located at 1100 and 1600 feet and were 1300 and 2700 feet in length, respectively. Observations were made at various points on the 2100 feet contour. In 1972, the study was moved from the Research Watershed, due to logistic difficulties. The following four transects were run on south-facing slopes in areas fairly close to the Watershed:

a. 27 Mile Elliott Highway: 1600 ft elevation; open dwarf birch-blueberry sites alternating with three white spruce, and one black spruce stringers; 1900 ft in length.

b. 21 Mile Elliott Highway: 1600 ft elevation; scattered small patches of birch, white spruce, black spruce and occasional treeless openings; 1100 ft in length.

c. 22 Mile Elliott Highway: 1100 ft elevation; pure pole-sized aspen grading into mixed aspen, birch, and black spruce; the latter grading into birch-black spruce, and finally to pure black spruce; 900 ft in length.

d. 12 Mile Elliott Highway, south side of Haystack Mtn: 1100 ft elevation; pure aspen grading into birch and aspen patches, then into birch-black spruce, and finally into black spruce; 1250 ft in length.

Vegetational patterns were recorded on all transects. In 1971, tree stems were counted in a 2-meter belt on either side of the line (with an estimate of most common basal area and height), conspicuous breaks in the shrubs, herb and floor vegetation were recorded, and any conspicuous species or species groups were noted. In 1972, some detail of vegetational sampling was eliminated as too time consuming in view of the objectives of the study, and more detail was added on quadrat sampling of ground vegetation. A general description of the vegetation was made for each 50 feet interval along the transect; slope and aspect were recorded at the start of each segment. For each obvious change in ground vegetation, species presence was recorded in a 1 meter square plot.

In 1971, soil samples were collected for analysis at each 75 feet interval along the transect. In 1972, these samples were taken and soil profiles described in or near the quadrat locations.

During 1972, the 1600 feet transect in the Research Watershed was visited further to obtain soil profile descriptions on soil samples for analysis and to check some of the vegetational descriptions to render them more comparable with the types of records being taken in 1972.

Soil analyses are presently being completed, and profile diagrams are being drawn of vegetational patterns, substrate conditions, slope and aspect. Analyses of these profiles for any recurring correspondence of patterns of correspondence of the various parameters largely will be done in May and June 1973, and a report will be written summarizing the information to date.

At present, only a few tentative observations of possible correlations can be made. As noted in the proposal for FY 1973, some of the vegetational breaks on the north-facing slope do seem to give information about substrate conditions, while others do not. Some of the latter are indicative of microtopographic differences and/or fire history, but some fit no discernible patterns. It was noted on that same slope that fractured large rock is closer to the surface under some of the Sphagnum dominated areas than under grass or birch sites, and that ground ice was not very shallow at time of maximum thaw under any of the types. The latter observation confirms a suspicion the principal investigator has been harboring for some time, and that is that many of the black spruce "bogs" on north-facing slopes are not maintained by the presence of a high impervious layer that impedes downward water percolation, but rather that they are not truly waterlogged, and are maintained and increased due to a very slow rate of annual thaw of the moss layers, with the moss kept moist by melting ice from below and frequent summer showers from above.

On the basis of very preliminary inspection of the data from 1972 the most surprising observation is that the substrate is amazingly uniform under quite diverse vegetational types. The only really conspicuous exception to this noted to date involves transect "a" above at Mile 27 Elliott Highway, on which the upper substrate layers are uniformly compact grey-brown fine silt loam under all types except the three white spruce stringers, which are underlain by a layer of fluffy pale pinkish-yellow silt.

VIII. Plans for Next Fiscal Year:

The study be continued on sites: (1) close to Fairbanks on a south-facing slope of 500-700 feet elevation; and (2) away from Fairbanks in the vicinity of Healy, and along the Alaska Highway north of Tok.

(1) There are some very conspicuous banding of vegetation on these lower slopes parallel with the slope--on the south-facing slopes, of grassy openings in depressions and of birch-aspen-white spruce on elevated areas; and on the north-facing slopes, grass-birch mixtures in depressions and mixtures of birch, white spruce and black spruce on the ridges. These are not fire patterns, and it would seem well worth ascertaining if the pattern if related to moisture conditions, snow pack duration, and/or to differences in substrates. A low elevation transect will be run on a north-facing slope as part of a McIntire-Stennis supported project.

(2) The study should be moved away from the uniform loess deposits so characteristic of the Tanana Uplands near Fairbanks to see if any patterns (or lack of correlated patterns) found in the Fairbanks areas are repeated, or if sharper correlations are found in areas where surficial soils may show more differences due to parent material variations.

In both (1) and (2), the same procedures followed in 1972 will be employed. Again, North- and south-facing slopes will be used in each major area, on the assumption that these will show the most extreme patterns for each area. To the extent possible, the same vegetation types investigated in the Fairbanks area, and the same elevations will be included to make the studies as comparable as possible.

IX. Publications to Date: None

BLM Research Progress Report
FY 1973

I. Project Title and Contract Number:

Fire Effects Study in Alaska
53500-CT2-224(N)

II. Contractor: Pacific Northwest Forest and Range Exp. Sta.
Forest Service, U.S. Department of Agriculture

III. Project Location: College, Alaska

IV. Personnel: BLM 1. Service Center Robert Martin
2. State Office Joe Kastellic

Contractor: Dr. Charles Cushwa, Project Leader

V. Starting Date: Jan. 1, 1972
Expected Completion Date: June 30, 1974

VI. Objective: To determine fire effects in the taiga ecosystem.

VII. Progress: Relations of time since burn, to fuel accumulation, forage production and utilization, physical and chemical properties of soil, permafrost depth, and age of vegetation are examined by grouping stands of vegetation on the basis of similarity and developing regression equations to predict changes in these parameters over time.

Burn stands, accessible by road from Fairbanks, were located to keep transportation and per diem costs at a minimum. Stands with known fire history were selected where possible. This included two burns discussed in Hardy and Frank's publication, Forest Fires in Alaska, recent burns (less than 20 years) with BLM fire reports available, and the Darling Creek burn on the Richardson Highway (photos available and mentioned in articles). Three stands in the proposed prescribed burn near Delta, a control stand at Wickersham Dome (an intensive fire effects study site), and two at Bonanza Creek Experimental Forest were included.

The study proposal work schedule suggests a desirable distribution of burns over a spectrum of type and age, and a work target of 30 burns per crew per season. A summary (Table 1) shows half the stands surveyed were in the black Spruce type with a relatively good distribution of age.

Number of Burns Surveyed by
Type and Time since Burn

Type	Time Since Burn (Years)						
	3-5	6-10	11-15	16-30	31-65	66-130	Total
	Number of Burns						
Black Spruce	2	4	4	2	5	5	22
Aspen		1	1	4	2		8
Birch			1		3	3	7
White Spruce				3		2	5
Total	2	5	6	9	10	10	42

This, of course, reflects the abundance of this type. The first season's work did not include any birch or white spruce stand less than ten years old. The close association of birch and white spruce should be considered in deciding the need for more stands, because they possibly can be combined. There is a void in the recent (less than 15 years) aspen, birch, and white spruce types.

A three-member crew was outfitted with and trained in the use of equipment to apply the Ohmann and Ream Ecological Inventory Procedure. The crew obtained vegetation information at 20 points in each stand.

Vegetation information on tree species, high and low shrubs, herbaceous lichens and mosses were recorded. Depth of the lichen layer and browse observations were included.

In addition, black and white photos and 35 mm color slides were obtained of the ground cover and of the stand in general. Soil samples, litter depth, and depth to permafrost were also included. Tree cores were obtained with an increment borer to establish age.

Measurements were made to obtain fuel data according to a sampling procedure developed by James Brown of the Northern Forest Fire Laboratory. Items inventoried were distance from top of the moss to tree crowns (lower dead and living branches), depth of upper (living) and lower moss layer, litter layer, dead aerial and ground fuel by four size classes, rotten wood, and vertical distribution.

Analysis

A computer capability was modified and used to obtain summaries of trees, seedlings, shrubs, and herbs for each stand. The vegetation information was processed to identify stands that are similar. The clustering of similar stands requires further verification, which is in progress.

The soils samples were processed in cooperation with the Cold Regions Research Engineering Laboratory (CRREL) and on contract with the Forest Soils Laboratory at the University of Alaska.

Statistical analysis to associate physical (slope, aspect, etc.) factors, soil (physical and chemical) properties, fuel factors, browse data, and age-since-burn with the groups of similar stands is in progress.

VIII. Plans for next fiscal year: To continue study with additional plot data and an analysis made from data collected.

IX. Publications to date: None

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title: Evaluation of Water Yield Potential in East Putah Creek Watershed under Multiple Use Management

Contract Number: 53500-CT0-42(N)

II. Contractor: University of California at Davis (funds provided by Bureau of Reclamation)

III. Project Location: East Putah Creek Watershed

State: California

District: Ukiah

IV. Personnel:	BLM:	1.	Service Center	Carl Rice
		2.	State Office	Stu Porter
	Contractor:	1.	Project Leader	R. H. Burgy

V. Starting Date: August 15, 1969

Expected Completion Date: August 1979 (dependent upon BR funds)

VI. Objective:

A. Gather basic resource data on the North East Putah Creek watershed.

B. Provide recommendations on areas of brush to be treated, the additional water yield that can be expected, and possible effects of conversion on multiple use.

VII. Progress: All field studies were continued during the year. These include agronomic, hydrological, hydrobiological and ecological. Base data was collected at each of the study sites.

VIII. Plans for Next Fiscal Year: Measurements and base data collection will be continued in FY 1974.

IX. Reports and Publications to Date: The following Progress Reports have been made:

1. Burgy, Robert H., Evaluation of Water Yield Potential in East Putah Creek Watershed Under Multiple Use Management. July 1970.

2. Burgy, Robert H., Evaluation of Water Yield Potential in East Putah Creek Watershed Under Multiple Use Management. January 1972.

3. Burgy, Robert H., Evaluation of Water Yield Potential in East Putah Creek Watershed Under Multiple Use Management. August 1972.

4. Branvold, Jerry. Berryessa Watershed Conversion Study Plots. (Undated report, Ukiah District).

BLM RESEARCH
PROGRESS REPORT 1973 F. Y.

I. Project Title and Contract No:

Financial Guides to Douglas-fir Reforestation Alternatives
Research Contract No. 14-11-0001-3872

II. Contractor:

University of California, Berkeley

III. Project Location:

Western Oregon

IV. Personnel:

BLM	1.	Service Center	K. Bergsvik
	2.	State Office	D. Nelson
Contractor	1.	Project Leader	D. Teeguarden

V. Starting Date and Completion Date:

July 1, 1965 - June 30, 1973

VI. Objectives:

a. To develop financial guides to Douglas-fir reforestation alternatives.

b. To set forth procedures for determining the guides.

c. To rank specific tracts in order of their promise as planting sites.

d. To list and discuss various items related to the general subject matter of the study.

VII. Progress:

A final report, "An Economic Model for Selecting Douglas-fir Reforestation Projects," was written and will serve as a users' manual and operational guidebook.

VIII. Plans for Next Fiscal Year:

Contract will be terminated as of end of current F.Y.

IX. Reports and Publications to Date:

a. Buongiorno J. and Teeguarden, D.E., "An Economic Model for Selecting Douglas-fir Reforestation Projects," Hilgardia, June 1973.

b. Teeguarden, D., Beck J. Jr., and Buongiorno J., A Computer Program for Evaluating Reforestation Investments, Berkeley, Calif., Oct. 1969.

c. Teeguarden D. and VonSperber H. L., Scheduling Douglas-fir Reforestation Investments, A Comparison of Methods, Forest Science, Dec. 1969.

d. Teeguarden D., Economic Criteria and Calculated Risk in Reforestation Investment Decisions, Journal of Forestry, Jan. 1969.

e. Teeguarden D., Economic Guides for Douglas-fir Reforestation in Southwestern Oregon, BLM Tech. Bull. 2, U. S. Dept. of Interior, Jan. 1969.

BLM
RESEARCH
PROGRESS REPORT 1973 FY

I. Project Title and Contract Number:

"Protecting Conifer Seeds from Rodents" #53500-CT1-45(N)

II. Contractor (or Cooperator):

University of California

III. Project Location: State: U. of California at Davis, California
District(s): Field locations on private land in California and BLM land in the Eugene District

IV. Personnel: BLM: 1. Service Center W. M. Smith
2. State Office C. Thomas
Contractor: 1. Project Leader Rex E. Marsh

V. Starting Date and Expected Completion Date:

Initiated FY 1970. Completion June 1973.

VI. Objective:

To find a substitute for endrin as a tree seed protectant against deer mice and other rodents.

VII. Progress:

During the third year of the project the screening of additional compounds was slowly terminated in favor of greater efforts in the field evaluation of alphanaphthylthiourea. Test plots were established in both California and Oregon but this time on a large scale with the treated seed being applied by helicopter as would be the case with operational direct seeding. Seed protection on most of those plots read is significantly better than the control plots where unprotected seed was applied. Alphanaphthylthiourea falls short of the protection offered by endrin treatment based on comparative studies made on private land in California with both treatments this last planting season. It would be premature to make final judgment at this time for the data has not yet been thoroughly analyzed.

VIII. Plans for Next Fiscal Year:

Contract terminated June 30, 1973.

IX. A presentation of a portion of the studies will be given at the "Symposium on Wildlife and Forest Management" to be held September 11-12, 1973 at the Oregon State University, Corvallis, Oregon. Additional research results are currently scheduled to be given at the Sixth Vertegrate Pest Conference to be held on March 5-7, 1974 in Anaheim, California.

One technical paper on the laboratory studies is currently being prepared for submission to one of the forestry journals and at least one other technical paper should result from the field studies.

A volume of selected references on alphanaphthylthiourea is nearly completed at this time.

A brief progress report was given at the California Forest Pest Action Council, Novermber 17, 1971, Sacramento, California. A review of the progress of the repellent studies was given at the Eighth Annual Meeting of the Technical Consulting Team - Forest Animal Research Unit, September 19-20, 1972, Arcata, California. Additional comments were made concerning the studies on May 18, 1972 at the Field Day sponsored by the Animal Damage Committee of the California Forest Pest Action Council.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title: Rehabilitation of Rangeland Damaged by Vehicular Use in the Panoche Hills

Contract Number: 53500-CT1-284(N)

II. Contractor: Pacific Southwest Forest and Range Experiment Station, Berkeley, California

III. Project Location: Panoche Hills

State: California

District: Folsom

IV. Personnel:

BLM:	1. Service Center	Carl Rice
	2. State Office	Stu Porter
	3. District Office	George Burma
Contractor:	1. Project Leader	Charlie Graham

V. Starting Date: March 1, 1971

Expected Completion Date: June 30, 1978

VI. Objective: Monitor changes imposed by management practices and uses. Determine impacts on soil, water, vegetation, air, wildlife, recreation and landscape values. Find ways to overcome past damage and prevent losses in environmental quality. Record sociological and biological inter-relationships of coordinated, complimentary and noncomplimentary uses.

VII. Progress: Precipitation at the Panoche Hills raingage measured 12.37 inches during the 1972-73 season. This is about five times the rainfall received in 1971-72 and is about twice the long-term mean annual rainfall. Due to good soil moisture and favorable temperatures, spring growth produced an abundance of wildflowers and red brome in the Panoche Hills area.

A new study based on preliminary work and observations accomplished last year was established in late winter of the 1972-73 season. The purpose of this study was to develop a method for establishing vegetation on motorcycle trails in an area of harsh soil and climatic conditions. Cultivation treatments included (1) none, (2) rolled, (3) disc, and (4) both disc and rolled. In addition, five cultural treatments were overlayed

to each cultivation treatment as follows: (1) unseeded, (2) seeded. (3) seeded and fertilized, (4) seeded and mulched, and (5) both fertilized, mulched and seeded. The seeding consisted of a mixture of shrubs, annual grasses, and legumes broadcast at a rate of about 35 pounds per acre. Seedling establishment of red brome was best on the seeded-disc and roll treatment while rose clover establishment was best on seed and mulch-disc and roll treatment.

Many of the new cultivation and mulching treatments should be effective in catching and holding the abundant seed produced this year by resident annuals. A good stand of annuals is expected to develop next growing season.

VIII. Plans for Next Fiscal Year: Measurements on all established plots will be continued three more years. In addition, a duplicate set of plots to those established in 1972-73 will be installed and measured during 1973-74.

IX. Reports and Publications to Date: Three annual reports have been prepared to date.

BLM RESEARCH
PROGRESS REPORT 1973 FY

1974 F

I. Project Title: Hydrologic effects of off-road vehicular use on public lands in California

Contract Number: 53500-CTO-369(N)

II. Contractor: Geological Survey, Rocky Mountain Region, Denver, Colorado

III. Project Location: Panoche Hills and Dove Springs, California

State: California

Districts: Folsom (Panoche Hills) and Bakersfield (Dove Springs)

IV. Personnel: BLM: 1. Service Center - Glenn H. Lipscomb

2. State Office - Stuart Porter

GS: 1. Project Leader - Gregg Lusby — Dick Hadley

V. Starting Date: July 1, 1970

Expected Completion Date: June 30, 1975

VI. Objectives: To quantify the effects of off-road vehicle use on the soil and vegetation resources, water quality and water quantity.

VII. Progress: Panoche Hills - An 18-month drought was followed by unusually heavy rainfall during the winter of 1972-73. Runoff from these heavy rains caused failure of two reservoirs in the study area leaving only a partial record of runoff for the period. Observations were made of precipitation, soil moisture and density and plant cover. Late in FY 1973 a resurvey of the erosion transects was made and area-volume surveys were made following reconstruction of the two damaged reservoirs.

Dove Springs - A number of erosion transects were resurveyed during May 1973 and permanent bench marks were set up to protect the study from further deterioration due to off-road vehicle use.

VIII. Plans for Next Fiscal Year: A new start on the runoff studies will be made at Panoche Hills and other studies will be continued until such time as significant results can be obtained with the reconstructed reservoirs. Resurveys of the Dove Springs transects will also be conducted.

IX. Reports and Publications to Date: None--other than annual progress reports.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title: Saylor Creek Experimental Range

Contract Number: Memorandum of Understanding

II. Contractor: Intermountain Forest and Range Experiment Station

III. Project Location: Boise, Idaho

IV. Personnel: BLM: 1. Service Center Rex Morgan
2. State Office Rex Colton

V. Starting Date: 1960
Expected Completion Date: June 30, 1973

VI. Objective:

1. To determine the forage value and grazing capacities of cheatgrass ranges compared to perennial grass ranges.
2. To determine feasibility, desirability and requirements for converting from cheatgrass range to perennial grass range.
3. How best to utilize cheatgrass.
4. How to avoid encroachment and dominance of cheatgrass if this species is deemed undesirable.

VII. Progress:

FS-INT-1701(2) Management of cheatgrass range in southern Idaho: influence of season of use on vegetal response and forage quality.

As part of this study forage was collected periodically during the March 15 through November 15 period for chemical analysis. Collections were obtained of 7 species (Agropyron desertorum, Bromus tectorum, Poa sandbergii, Elymus cinereus, Stipa comata, Agropyron riparium, and Sitanion hystrix) since 1962. Originally, the species were to be analyzed for nitrogen (or protein) content. During this report period, approximately 220 samples were analyzed for nitrogen, phosphorus, sulfur, calcium, magnesium, zinc, copper, manganese, sodium, potassium, and iron contents.

The chemical content was related to time of collection and an equation developed. Table 1 shows this relationship and the respective correlation values. Additional analyses will be performed on the data to determine predictive values.

Also as a part of this study, an experiment was set up to determine the effect of nitrogen and phosphorus fertilization on cheatgrass and bunchgrass ranges. The effect of the fertilizers on the production is given in the 1971 Progress Report as revised in 1973 (pg. 42-43). However, during the current report period forage samples from the experiment were analyzed for 11 elements (as above). The data is awaiting analysis. The purpose is to determine the levels of each element as influenced by nitrogen and phosphorus fertilization.

FS-INT-1701(12): Influence of grazing at selected season and intensities on cheatgrass and associated plants.

This is the major grazing study at Saylor Creek. A discussion of the treatments and objectives begins on page 26 of the 1971 Progress Report. The study was terminated in 1973. Forty pastures were involved containing 8000 frequency plots and 1600 quadrats. All were remeasured during May of 1973. The data is currently being processed for analysis.

FS-INT-1701(17): Effect of Artemisia tridentata removal on mineral cycling.

Four sites were selected in southern Idaho to compare the effects of sagebrush removal on mineral cycling and to determine whether such removal leads to losses of certain elements. Soils were collected by decimeter increments to a depth approximately 2x the depth of roots in the burned areas. Soils were processed for chemical analysis and are currently being analyzed for chemical content. An example is given in figure 1.

Sagebrush was harvested from 3 x 10 meter plots, separated into leaf, twigs $<$1 cm, twigs $>$ 1 cm, flowers, flower stalks, deadwood, and litter. The material has been oven-dried and ground for chemical analysis. To date, chemical information includes phosphorus, sulfur, calcium, magnesium, potassium, manganese, zinc, and copper contents. Additional analysis will include nitrogen, cobalt, molybdenum, and iron contents.

Cages were constructed to collect litter fall. Samples are collected periodically and will be chemically analyzed to determine the rate of return. Litter bags were installed and have been picked up periodically to determine the rate of decomposition of leaves.

All plant species on the burned and non-burned areas of the four species are currently being collected to determine phytomass and will be chemically analyzed for elemental composition.

In cooperation with Roy Harniss, IF&RES, Logan, Utah, data from this study will be used to develop a predictor for leaf weight of sagebrush using a simplified height-circumference technique. At present, the data has been analyzed, a manuscript prepared, which will be sent out for review in the near future.

Data from this study will be used for Murray's Doctoral dissertation at Washington State University.

Supplemental Study--Cooperation with the University of Idaho.

In 1971, yearling calves were supplemented with phosphorus and biuret either 112 days or delayed and supplemented for 56 days, and a control group. These animals were sent to Caldwell for finishing and analysis of carcass. Table 2 shows the results of this experiment up to the time they were sent to Caldwell.

In 1972, a supplemental study using cows and calves was initiated. The principle objective was to determine whether additional protein and/or energy would serve to maintain or increase gains in both cows and calves. Results from one year indicated such additions did not improve either cows or calves performance.

However, as an adjunct to this study one-half the calves were early weaned from their mothers and were put in feed lots in early September. Early weaned calves gained more than the calves remaining in the field. The cows of the early weaned calves also gained more than the group which retained their calves. A report from the University of Idaho is forthcoming.

1973 is the last year for supplement studies at Saylor Creek. Presently the studies being conducted are the same as for 1972.

All sampling at the experimental range has been completed and the data is in the process of being analyzed. A completed report will be submitted by approximately mid-September. This report will also include a resume of supplemental studies conducted by the University of Idaho.

VIII. Plans for Next Fiscal Year: None - Termination of project effective June 30, 1973.

IX. Reports and Publications to Date:

1. Klemmedson, James O., and Robert B. Murray. Use and Measurement of Site Factors and Soil Properties in Evaluation of Range Site Potential. USDA Misc. Pub. 940 (Range Research Methods). 1962. p. 68-77.

2. Klemmedson, James O. Topofunction of Soils and Vegetation in a Range Landscape. In: Forage and Plant Physiology and Soil-Range Relationships. Amer. Soc. Agron. Spec. Pub. 5, 1964. p. 176-189.

3. Klemmedson, James O., and Justin G. Smith. Cheatgrass (Bromus tectorum L.). Bot. Rev. Apr.-June):226-262. 1964.

4. Klemmedson, James O., and Robert B. Murray. Research on Management of Cheatgrass Ranges. Proc. Cheatgrass Symposium, Vale, Oregon. July 27-30, BLM. p. 38-50. 1965.

5. Murray, Robert B., and James O. Klemmedson. Response of Cheatgrass and Associated Plants to Seasonal Grazing. Proc. Range Weed Research Meeting and Field Tour. Elko, Nevada. Sept. 14-16, BLM. p. 6-8. 1965.

6. Murray, Robert B. Grazing Experiments with Cattle and Sheep on Cheatgrass Range in Southern Idaho. Range and Pasture Field Day. Knoll Creek Field Laboratory. Max C. Fleischmann College of Agriculture, Univ. of Nev. June 7, 1967. p. 5-6.

7. Murray, Robert B., and James O. Klemmedson. Cheatgrass Range in Southern Idaho: Seasonal Cattle Gains and Grazing Capacities. J. Range Management. 21:308-313. 1968.

8. Murray, Robert B. Cattle Production on Cheatgrass Range. Western Livestock Jour. (Oct. Issue). 1968.

9. Murray, Robert B. Grazing Capacity, Sheep Gains: Cheatgrass, Bunchgrass Ranges in Southern Idaho. J. Range Management 24:407-410. 1971.

10. Olsen, T. E., R. C. Bull, and S. D. Farlin. Supplementation of Cattle on Cheatgrass Range. Abstract J. Animal Sci. 33: 310. 1971.

11. Wright, Henry Albert. Influence of Fire on Important Bunchgrasses of the Sagebrush-grass Region of Southern Idaho. MS Thesis, Utah State Univ. 1962.

12. Wright, Henry Albert. An Evaluation of Several Factors to Determine why *Sitanion hystrix* is More Resistant to Burning than *Stipa comata*. PhD Thesis, Utah State Univ. 1964.

13. Wright, Henry A., and James O. Klemmedson. Effects of Fire on Bunchgrasses of the Sagebrush-grass Region in Southern Idaho. Ecology 46: 680-687. 1965.

14. Wright, Henry A. Contrasting Responses of Squirreltail and Needle and Thread to Herbage Removal. J. Range Management 21: 398-400. 1967.

15. Wright, Henry A. Response of Big Sagebrush and Threetip Sagebrush to Season of Clipping. J. Range Management 23: 20-22. 1970.

16. Wright, Henry A. A Method to Determine Heat-caused Mortality in Bunchgrass. Ecology 51: 582-587. 1970.

17. Wright, Henry A. Predicting Yields of Two Bunchgrass Species. Crop Sci. 10: 232-235. 1970.

CURRENTLY BEING WRITTEN:

18. Harniss, Roy O., and Robert B. Murray. Thirty Years of Ecological Change After Burning in a Sagebrush-grass Community. J. Range Management.

19. Murray, Robert B. Yearling Cattle Response to Grazing Intensity on Cheatgrass Range. J. Range Management.

20. Murray, Robert B. Effects of Nitrogen Fertilization on Yields and Protein Content of Cheatgrass and Needle and Thread Grass Range. J. Range Management.

TABLE 1. RELATIONSHIP OF CHEMICAL CONTENT OF SEVEN SPECIES TO SEASON (Y = PERCENT OR PARTS PER MILLION, X = JULIAN DATE). DATA FROM SAYLOR CREEK EXPERIMENTAL RANGE, GLENNS FERRY, IDAHO

ELEMENT	Y VALUE	AGROPYRON DESERTORUM	AGROPYRON RIPARIUM	BROMUS TECTORUM	ELYMUS CINEREUS	POA SANDBERGII	SITANION HYSTRIX	STIPA COMATA
NITROGEN	%	$Y=-1.336+\frac{439.459}{X}$ $r^2=0.898$	$Y=1435.26\,X^{-1.36532}$ $r^2=0.832$	$Y=31371.9(X^{-2.02269})$ $r^2=0.858$	$Y=-2.270+\frac{640.572}{X}$ $r^2=0.952$	$Y=-.6226+\frac{322.46}{X}$ $r^2=0.816$	$Y=10.961e^{-.0123X}$ $r^2=0.871$	$Y=37856+(X^{-1.56208})$ $r^2=0.793$
PHOSPHORUS	%	$Y=-.0448+\frac{33.3452}{X}$ $r^2=0.751$	$Y=-.0258+\frac{25.7868}{X}$ $r^2=0.751$	$Y=.130728+\frac{48.5135}{X}$ $r^2=0.827$	$Y=24539.7(X^{-2.397})$ $r^2=0.963$	$Y=-.0873+\frac{34.4237}{X}$ $r^2=0.762$	$Y=.8357e^{-.0110X}$ $r^2=0.824$	$Y=.500527e^{-.00838X}$ $r^2=0.696$
SULFUR	%	$Y=.0389+\frac{11.3405}{X}$ $r^2=0.437$	$Y=.0386+\frac{11.8265}{X}$ $r^2=0.572$	$Y=-.045183+\frac{21.2405}{X}$ $r^2=0.701$	$Y=-.0679+\frac{28.9297}{X}$ $r^2=0.839$	$Y=.00769+\frac{15.0511}{X}$ $r^2=0.514$	$Y=12.945(X^{-.9316})$ $r^2=0.574$	$Y=.253039+(-.000683X)$ $r^2=0.567$
CALCIUM	%	–	–	$Y=-2.29325+\frac{577102}{X}$ $r^2=0.580$	–	–	–	–
MAGNESIUM	%	–	–	$Y=-9.0466+\frac{22.8663}{X}$ $r^2=0.728$	–	–	–	–
POTASSIUM	%	$Y=-.293+\frac{247.75}{X}$ $r^2=0.767$	$Y=4.33e^{-.0082X}$ $r^2=0.743$	$Y=-1.3581+\frac{392.644}{X}$ $r^2=0.792$	$Y=-1.897+\frac{679.728}{X}$ $r^2=0.935$	$Y=-.581+\frac{209.776}{X}$ $r^2=0.658$	$Y=3.5947+(-.0136X)$ $r^2=0.660$	$Y=2.9775e^{-.00723X}$ $r^2=0.422$
ZINC	PPM	$Y=5168.72(X^{-1.240})$ $r^2=0.708$	$Y=3.264+\frac{1371.74}{X}$ $r^2=0.449$	$Y=.5966+\frac{2131.71}{X}$ $r^2=0.554$	$Y=-14.2873+\frac{4179.24}{X}$ $r^2=0.907$	–	$Y=2.8117+\frac{1601.05}{X}$ $r^2=0.426$	$Y=-1.2+\frac{2059.14}{X}$ $r^2=0.681$
COPPER	PPM	$Y=358.317(X^{-.8121})$ $r^2=0.722$	–	–	$Y=-2.007+\frac{1345.75}{X}$ $r^2=0.866$	–	$Y=318.863\,X^{-.7756}$ $r^2=0.514$	$Y=\frac{X}{-12.781+.2580X}$ $r^2=0.370$
MANGANESE	PPM	–	–	–	$Y=15099(X^{-1.229})$ $r^2=0.371$	–	–	

*SODIUM AND IRON-NO RELATIONSHIPS WITH SEASON

TABLE 2. RESULTS OF 1971 SUPPLEMENTAL TRIALS AT SAYLOR CREEK EXPERIMENTAL RANGE... COOPERATIVE STUDY WITH UNIVERSITY OF IDAHO.

Average Body Weight of Treatment Group

	Initial Wt.	28 days	56 days	84 days	112 days	Caldwell Wt.
Supplement group	551.5	606.4	624.7	657.8	676.3	668.3
Delayed supp.	577.9	612.1	632.8	655.9	669.8	662.3
Control	598.7	647.3	666.9	690.5	705.8	698.8

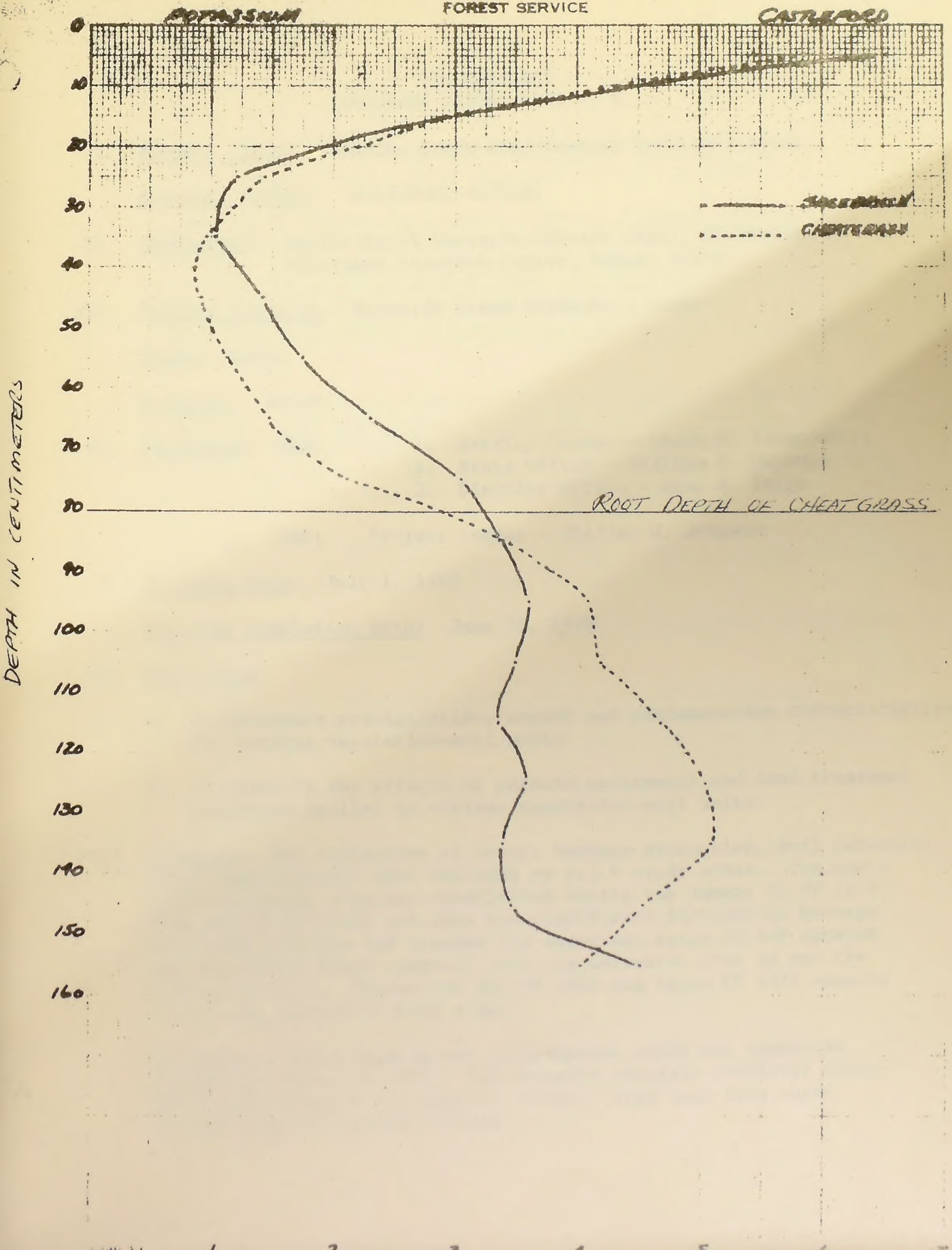
Average Daily Gain

	28 days	56 days	84 days	112 days
Supplement group	1.96	1.31	1.27	1.12
Delayed supp.	1.22	0.98	0.93	0.82
Control	1.74	1.22	1.09	0.96

	1st 28	2nd 28	3rd 28	4th 28 days
Supplement group	1.96	0.66	1.18	0.66
Delayed supp.	1.22	0.74	0.83	0.50
Control	1.74	0.70	0.84	0.55

FIGURE 1.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE



BLM RESEARCH
PROGRESS REPORT 1973 F. Y.

I. Project Title: Reynolds Creek Experimental Watershed Study

Contract Number: 14-11-0001-4162(N)

II. Contractor: Agricultural Research Service (ARS), Northwest Watershed Research Center, Boise, Idaho

III. Project Location. Reynolds Creek Watershed, Idaho

State: Idaho

District: Boise

IV. Personnel: BLM:
1. Service Center - Glenn H. Lipscomb
2. State Office - William F. Mabbutt
3. District Office - Alan B. Tripp

ARS: Project Leader - Clifton W. Johnson

V. Starting Date: July 1, 1968

Expected Completion Date: June 30, 1978

VI. Objectives:

A. To determine precipitation, runoff and sedimentation characteristics for various vegetation-soil units.

B. To quantify the effects of certain management and land treatment practices applied to various vegetation-soil units.

VII. Progress: The collection of cover, herbage production, soil moisture, runoff and sediment data was made on all 9 study areas. The ninth and final study area was established during the summer of CY 1972. Data for CY 1972 did not show the significant increase in herbage production for the two treated big sagebrush sites (2,4-D sprayed and mechanical brush removal) over the untreated area as was the case in CY 1971. Production for CY 1972 was below CY 1971 amounts on all big sagebrush study areas.

Preliminary field work on the infiltration study was completed during the summer of 1972. The portable rainfall-simulator gamma-probe infiltrometer was used to collect field data from three general areas in Reynolds Creek.

Evapotranspiration (ET) data was used to develop an energy balance-resistance model for computing ET over sagebrush rangeland and irrigated alfalfa. Data required for the model consists of air temperature and humidity, windspeed, surface roughness, and an estimate of the effective resistance of the surface.

Water quality samples were collected from 8 channel sites at bimonthly intervals starting in October 1972. Aquatic samples were taken concurrently with chemical sampling at these sites to determine composition and density of insect and other invertebrate fauna and algal species throughout the channel system. Only preliminary statistical analyses have been prepared to date on water quality data.

Data collection on the Rabbit Creek Frail Lands area was continued during the year (first year as part of cooperative research under Contract No. 14-11-0001-4162(N)). Precipitation and runoff data will be used later in determining a detailed water balance covering a 5-year period of October 1969 through September 1973 (water years).

VIII. Plans for Next Fiscal Year: Data collection will be continued for cover, herbage production, soil moisture, erosion, sediment, runoff and water quality at all applicable sites.

Weather and lysimeter data will be utilized to further develop the evapotranspiration model.

Frail lands data on Rabbit Creek will be collected through water year 1973 (through September 30, 1973). A seasonal water balance will be developed using five years of data (1969 through 1973).

Two or three watershed models which might be applicable to rangelands will be tested during FY 1974.

IX. Reports and Publications to Date: Annual progress reports have been made for each year. No publications dealing specifically with project results have been published to date although several publications covering development of models and methodology to be used by ARS have been published by ARS cooperators (Utah State U.; U. of Idaho).

BLM RESEARCH
PROGRESS REPORT 1973 F.Y.

I. Project Title: Infiltration Studies on Selected Vegetation-Soil Units within Twelve Range Watersheds in Nevada.

Contract Number: 14-11-0001-4632(N)

II. Contractor: Nevada Agricultural Experiment Station, University of Nevada, Reno, Nevada.

III. Project Location: Nevada range watersheds

State: Nevada

Districts: Battle Mountain, Ely and Las Vegas.

IV. Personnel: BLM:
1. Service Center - Glenn H. Lipscomb
2. State Office - John Trimmer

U. of Nevada:
1. Project Leader - Wilbert H. Blackburn

V. Starting Date: July 1, 1969

Expected Completion Date: June 30, 1973 (terminated as scheduled)

VI. Objectives:

A. To establish infiltration, surface run-off, and sediment production relationships for selected vegetation-soil units in different range and hydrologic condition classes.

B. To establish what cover (vegetation, litter, pavement and rock) and soil parameters influence infiltration, surface run-off and sediment production on selected vegetation-soil units.

C. To develop parameters for use in identifying hydrologic soil groups and subgroups.

VII. Progress: During the year, previously collected data was compiled, analyzed and interpreted to provide information for the final report. A report on results, recommendations and implementation action will be initiated following receipt of copies of the final report (due by 6/30/73--preliminary draft reviewed in April 1973).

VIII. Plans for Next Fiscal Year: Project is terminating on June 30, 1973.

IX. Reports and Publications to Date: Only annual progress reports 3/30/70; 3/18/71; 2/23/72). Final report due 6/30/73.

VIII. Plans for Next Fiscal Year. Project is terminating on June 30, 1971.

IX. Reports and Publications to Date: Only annual progress reports 3/20/69; 3/16/70; 2/23/71). Final report due 6/30/71.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title: The Evaluation and Management of Big Game Habitats in Nevada

Contract Number: 14-11-0001-3779(N)

II. Contractor: Nevada Agricultural Experiment Station, University of Nevada, Reno

III. Project Location: Nevada, various districts, generally state-wide

IV. Personnel:

BLM:	1.	Service Center	Frank Stanton (COAR)
	2.	State Office	Jim Yoakum
Contractor:	1.	Project Leader	Paul Tueller

V. Starting Date: Initiated FY 65
Expected Completion Date: FY 74

VI. Objective: Evaluate potential forage production, condition and trends at selected habitats. Evaluate various habitat development practices.

VII. Progress: Conducted a follow-up field study repeating site analyses made in 1965-66.

On Morey Bench, Paine Springs and Pequop Mountains winter deer range successional vegetation changes (trend) have generally been slight. Deer use impact does not show any direct relationship with trend in which deer populations will suffer. Roads, mining operations and improvements, livestock, improper management, off-road vehicles and developments constitute direct impacts. These impacts, past, present and future, are responsible for declining trends of important deer range plant communities. Plant succession or trend analysis describe influence of these forms of land use. Future management programs should be developed to include careful consideration of such impacts.

Prepared first draft of a final report.

VIII. Plans for Next Fiscal Year: Continue reevaluation of selected sites. Complete final report; publish and distribute copies.

IX. Reports and Publications to Date: Eight Masters theses; annual progress reports; draft of final report.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title and Contract Number: Log Grade and End Product Recovery Study
14-11-0001-3551

II. Contractor: Pacific Northwest Experiment Station

No Progress Report received for this research contract for F.Y. 1973

BLM
RESEARCH
PROGRESS REPORT 1973 F.Y.

I. Project Title and Contract Number:
Development and Propagation of Blister Rust Resistant Strains of Western White Pine and Sugar Pine
14-11-0001-4361(N)

II. Contractor:
U. S. Forest Service

III. Project Location:
Western Oregon - Dorena Forest Research Tract

IV. Personnel:

BLM:	1.	Service Center	K. Bergsvik
	2.	State Office	C. Thomas
Contractor:	1.	Project Leader	P. Thiessen

V. Objective:
To develop rust resistant strains of western white pine and sugar pine for growing timber crops

VII. Progress in F.Y. 1973

A total of $138,073 will have been expended by Dorena Project in F.Y. 1973 as of June 30, 1973. Of the total expenditure, $112,720 (82%) involves regular P&M fundings; $12,958 (9%) are BLM cooperative fundings for the sister agency's portion of the progeny evaluation phase of the rust resistant white pine program; and, $12,400 (9%) are insect and disease control fundings expended in the parent tree location and progeny evaluation phases of the white pine resistance program. Of the $138,073 total, 21% was expended on salaries, 3% on per diem, 4% on fleet use and maintenance and 14% on equipment-materials purchase, utilities and incidental costs.

White pine resistance production programming accounts for 81% of the total expenditure. White pine tree location and breeding (Subproject No. 1) accounts for 21% of the dollar total; progeny evaluation nursery and seed processing (Subproject No. 2) accounts for 47% of the dollar total; white pine seed orchard management (Subproject No. 3) accounts for 10% of the total; ponderosa pine seed orchard management and Douglas-fir tree improvement (Subprojects 4 & 5) account for 1% of the total; seed orchard wwp reforestation seed production (Subproject No. 6) accounts for 3% of the total; and, clerical, administration and buildings and grounds maintenance accounts for 18%.

Major production figures are listed below by subproject and work title. Recurring maintenance and administrative items are not listed categorically (seed orchard cultivation, irrigation, fertilization and pruning; personnel training; work and management plans; records creation and maintenance; ranger district coordination, service & inspection; nursery irrigation, fertilization and weeding; building and grounds maintenance; etc.).

SUBPROJECT NO. 1 White Pine Tree Location and Breeding

1. Trees located by Dorena Crew: Sugar pine 5 West. White pine 25
2. Crosses completed BY 1973 (FS only): Sugar pine 20 WWP 77
3. Crosses started FY 1973 (FS only): Sugar pine 43 WWP 53
4. Diallel groups completed FY 1973: Sugar pine 1 WWP 1 1972 poll.
5. Diallel groups attempted FY 1973: Sugar pine 3 WWP 7 1973 poll.
6. Western white pine progeny sib crosses (F1) completed FY 1973: 72 . 72 poll.
7. Western white pine progeny sib crosses (F1) attempted FY 1973: 113 . 73 poll.
8. Wind screen lots collected by Dorena Crew in FY 1973: 45.

SUBPROJECT NO. 2 White Pine Seed Extraction, Nursery Management & Progeny Evaluation

1. Seed lots extracted - 1971 crosses: WWP: FS 117 BLM 9 SP: FS 11 BLM 49
2. Wind seed lots extracted: WWP: FS 83 BLM 0 SP: FS 0 BLM 3
3. WWP progeny (F1) seed lots extracted - 1971 crosses: 32
4. Seed lots transplanted for FY 1974 inoculation: SP 215 (15M) WWP 278 (21M)
5. Seed lots sown for FY 1975 inoculation: SP 166 (13M) WWP 333 (26M)
6. Diallel groups sown for FY 1975 inspection: SP 1 WWP 1
7. Seed lots inoculated in FY 1973: SP 320 WWP 376.
8. Crosses inspected for bark-stem reactions in FY 1973: SP 62 WWP 96
9. Families evaluated for needle lesion reactions in FY 1973: SP 320 WWP 376
10. No. of WWP progeny siblings planted in CGRD field area: 2443
11. No. of progeny seedlings sent to West Fir Nursery for distribution to various field units: SP 4500 WWP 10600

SUBPROJECT NO. 3 White Pine Seed Orchard Management (Includes Subproj. No. 6 - seed production)

1. No. WWP progeny trees planted in seed orchard: 130
2. No. of WWP grafts made in seed orchard FY 1973: 418
3. Cumulative total of ramets (both species) in seed orchard: FS 5284 BLM 1088
4. No. cones collected in WWP seed orchard for reforestation: 52 bushels
5. No. cones currently on seed orchard WWP trees for reforestation: 5000+
6. No. wwp flowers hand-pollinated in seed orchard this spring for reforestation seed production: 2000+
7. No. of Ribes plants transplanted to Dorena garden in FY 1973: 250 (322 total)
8. No. of Ribes groups located and tagged for later transplant: 17 (85 plants)

VIII. Plans for next fiscal year

A. Continue to produce seed with usable resistance so that reforestation seed needs can be satisfied beginning in 1974.

B. Continue to upgrade resistance and other desirable traits of western white pine and sugar pine.

BLM
RESEARCH
PROGRESS REPORT FY 1973

I. Project Title and Contract Number:

Animal Damage Control in the Reforestation of Forest Lands
14-11-0001-4249(N)

II. Contractor (or Cooperator):

Oregon Forest Research Laboratory, Oregon State University
State of Oregon

III. Project Location: State Western Oregon

IV. Personnel:

BLM:	1.	Service Center	W.R. Smith
	2.	State Office	Chas. Thomas

Contractor: Project Leader Hugh C. Black, OSU

V. Starting Date and Expected Completion Date:

July 1, 1970 - June 30, 1975

VI. Objective:

a. To determine the effects of herbicide-induced vegetational changes on the composition and abundance of small mammals.

b. To determine the influence of herbicide-induced vegetational changes on distribution of deer and on the occurrence of browsing damage to forest regeneration on herbicide treated areas.

VII. Progress:

Non-stocked areas were treated with herbicides. The areas were then planted with seedlings. This spring a survey was made of the gopher activity on the treated and non-treated areas.

VIII. Plans for Next Fiscal Year:

The areas will be retreated with herbicides. The areas will be replanted with seedlings. Next spring a survey will be taken of the gopher activity on the areas.

IX. Reports and Publications to Date:

John E. Borrecco, Hugh C. Black and Edmund F. Hodven presented a paper "Response of Black-tailed Deer to Herbicide-Induced Habitat Changes" at the meeting of the Western Association of State Game and Fish Commissioners at Portland. The paper was published in the Conference Proceedings.

A Master's Thesis "The Response of Animals to Herbicide-Induced Habitat Changes" was submitted by John E. Borrecco, Oregon State University.

BLM RESEARCH
PROGRESS REPORT 1973 FY

I. Project Title and Contract Number:
Inter and Intra Specific Hybridization in the Genus Pseudotsuga
14-11-0001-4250(N)

II. Contractor:
Oregon State University

III. Project Location:
Western Oregon

IV. Personnel:

BLM:	1.	Service Center	K. Bergsvik
	2.	State Office	C. Thomas
Contractor::	1.	Project Leader	Dr. K. K. Ching

V. Starting Date: July 1, 1966
Expected Completion Date: Indefinite

VI. Objective:
To determine the best mating combinations for more rapid height growth and improved survival in provenance and species hybrids of Douglas-fir

VII. Progress FY '73:

A. Seeds of 201 crossings were sown in cold frames during the month of April 1972. Assessments made at the end of the growing season indicated there are approximately 8,000 1-0 seedlings resulting from this sowing.

B. A complete field check on the 1969 outplanting was made. Three outplant areas were included in this assessment. They are Corvallis Research Nursery, Dorena and Burnt Wood plots. Seed parents of 16 provenances used in this test were selected from the Willamette Valley plantation, while 4 different pollen sources (BC-1, BC-338, southern Oregon and open-pollination) were used for crossing work.

Statistical analysis of height growth of various groups of provenance hybrids indicated that there was a strong gene x environment effect. Hybrids planted in Research Nursery plots had the best growth, and the shortest trees occurred in Dorena, while heights of trees in the Burnt Wood plot fall in between.

Analysis made on height growth of crosses when different pollen sources were used (Table 1) showed that there was no significant differences between the British Columbia pollen lots. Highly significant differences were found between BC-1 pollen vs. southern Oregon pollen and wind pollination. There was also a different effect when southern Oregon pollen and wind pollination were compared.

Table 2 shows statistical differences in height growth of seedlings from four provenances, i.e. seed source 6, Shelton, Washington; seed source 7, Tillamook, Oregon; seed source 8, Willamette Valley, Oregon; and seed source 14, Butte Falls, Oregon, using different pollen lots. There were many combinations indicating better height growth (nine of them with British Columbia pollen lots), however, only 3 out of the 15 groups showed statistical significance at the 5% level.

VIII. Plans for Next Fiscal Year '74:

A. Field assessments on 3,389 hybrids planted in 1970 in 8 progeny testing areas (5 at McDonald Forest, 3 at the Research Nursery) will be collected and analyzed in the fall of 1973.

B. Sometime in the winter of 1973, 8,000 2-0 hybrid seedlings from 200 crosses will be lifted and marked for outplanting in 2 progeny testing sites on BLM lands.

C. Selection for 2 outplant areas will be conducted jointly with BLM personnel in July 1973.

D. Refinement of computer program will be continued so that easier methods of field data collection and storage techniques can be improved.

IX. Reports and Publications to Date:

A. A Natural Chimera of Douglas-fir by Kim Ching and Allen Doerksen, April 1970 - OSU paper.

B. A Comparative Karyotype Analysis of Pseudotsuga menziesii (Mirb.) Franco, and Pseudotsuga Wilsoniana (Hayata) by Gerald Thomas and Kim Ching. Silvae Genetica Vol. 17, No. 4, 1968.

C. Provenance Study of Douglas-fir in the Pacific Northwest Region by Kim Ching and Dale Bever. Silvae Genetica - Jan-Feb 1969.

D. Hybridization Between Douglas-fir and Bigcone Douglas-fir by Kim Ching. Forest Science, Vol. 5, No. 3, September 1969.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title and Contract Number: Forest Fertilization 14-11-0001-4637

II. Contractor:
University of Washington

No Progress Report received for this Research Contract for FY 1973.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title: Effect of chemical fire retardants on survival of juvenile salmonids.

Contract Number: 53500-CT2-85(N) 1973

II. Contractor: National Marine Fisheries Service, Northwest Fisheries Center, Seattle, Washington.

III. Project Location: Prescott Environmental Station, Prescott, Oregon.

IV. Personnel:

BLM:	1.	Service Center	Robert L. Borovicka
	2.	State Office	None
Contractor:	1.	Region	George R. Snyder
	2.	Laboratory	Ted H. Blahm

V. Starting Date: July 1, 1972
Expected Completion Date: June 30, 1973

VI. Objective:

1. Conduct a series of bioassay tests to determine the affect of two commercial fire retardants on two size classes of juvenile rainbow trout.

2. To determine the median tolerance limit (TL_m), i.e., the concentration of the tested retardants at which 50% of the test animals are able to survive for a specified time at pH 7 and 8 and water temperatures of 10, 15, and 20° C.

3. Provide results of the work to the Bureau of Land Management and publish the information for proper distribution to interested agencies and personnel.

VII. Progress: July 1, 1972 to June 1, 1973.

Twelve tests using juvenile rainbow trout have been completed. This series of tests was done at pH of 7.0 ± .2 and water temperatures of 10, 15, and 20° C. Table 1 is a summary of the results. Tolerance limits were decreased as temperature increased with the exception of one group.

Comparing the 1973 tests with those done last fiscal year, it is evident that the lower pH's increased the fishes' tolerance. This is explainable by the decreased amount of ammonia present at pH 7. A complete series of tests using the same conditions (fish, retardant,

water temperatures) will be done at pH's of 8.0 ± .2. Approximately ten times the amount of ammonia will be released at pH 8 than at pH 7, consequently, fish tolerance is reduced drastically.

Also tested the compounds of 10-34 and diammonium phosphate which are the ammomiacal compounds of 931 and 202XA, respectively. Toxicity, for all practical purposes, was the same as the complete compounds of 931 and 202XA. This is an indication that the causitive factor is ammonia.

VIII. Plans for Next Fiscal Year: None -- unless requested.

IX. Reports and Publications to Date: Preliminary report covering work done in FY 1972 has been submitted to BLM. General guidelines for use of retardants near aquatic environments has been given to BLM personnel through a Washington Office directive. No conclusions as to toxicity to fish between chemical retardants should be made until all work is completed and exposed to statistical analysis. Conclusions should be approved by both National Marine Fisheries Service and Bureau of Land Management.

BLM RESEARCH
PROGRESS REPORT 1973 F. Y.

I. Project Title and Contract No:

Modeling the Forestry System of the BLM as a Basis for Predictions and Decisions - Contract No. 53500-CT3-4(N)

II. Contractor:

Research Foundation of State Univ. of New York

III. Project Location:

Syracuse, N. Y. and Western Oregon

IV. Personnel:

BLM	1.	Service Center	K. Bergsvik
	2.	State Office	D. Nelson
Contractor	1.	Project Leader	N. Christiansen

V. Starting Date and Expected Completion Date:

July 1, 1964 - June 30, 1974 (Tentative)

VI. Objective:

1. To perform basic research leading to the development of models of the Bureau's land management system.

2. To test the applicability of the models and to devise means for improving such applicability.

VII. Progress:

1. A research project related task-force developed a report on the Bureau's resource information system, which clarified the role of the research project in BLM's work and will lead towards the implementation of specific models in a sample district. Refer to "Resource Information Systems for the BLM,' November 1972, for further details.

2. The concepts of the Program Simulator Model were crystallized and its several subroutines completed.

3. Work continued on the development of the Operations Simulator Model which will complement the Program Simulator in the prediction system.

4. Work was begun on the Forest Response Simulator Model which will generate biological response data for application as a subroutine in the Program and Operations Simulators.

5. Work was completed on the Eugene Decision evaluator.

6. The regeneration studies were brought to a conclusion and a final report written.

Note: For more detailed information relating to items 2 through 6, refer to "Guides to Land Management - An R. & D. Project, Progress 1954-1972; Plans, 1973 -" dated June 1973.

VIII. Plans for Next Fiscal Year:

1. Program simulator will be completed and implemented on an operational basis in the Eugene District in conjunction with other elements of the Resource Information System.

2. Operations and Response Simulators will be completed.

3. A second report, specifically for use within BLM explaining the Decision Evaluator, will be completed.

4. A review will be undertaken of the problems and opportunities for extending Phase I of the research project to eastern Oregon.

5. An effort will be made to reach a satisfactory and clear decision about the Whittaker Timber-Wildlife Simulator -- either to go forward with the study or abandon it.

IX. Reports and Publications to Date:

See Attached list.

GUIDES-TO-LAND-MANAGEMENT REPORTS

1. Radosta, John M.: Contributions of BLM Resource Management to the Economy of Western Oregon; Syracuse, New York, May 1966; vi, 113 pages.

2. Christiansen, Neils B.: Forest Resource Management as a System; Journal of Forestry, October 1968; pages 778-781.

3. Teeguarden, D. E., and H. L. VonSperber: Scheduling Douglas-fir Reforestation Investments, a Comparison of Methods; Forest Science, December 1968; pages 354-368.

4. Teeguarden, D. E.: Economic Criteria and Calculated Risk in Reforestation Investment Decisions; Journal of Forestry, January 1969; pages 25-30.

5. Teeguarden, D. E.: Economic Guides for Douglas-Fir Reforestation in Southwestern Oregon; U.S. Department of the Interior, Bureau of Land Management Technical Bulletin 2, January 1969; 27 pages.

6. Christiansen, Neils B.: Systems Analysis in Land Management; Society of American Foresters, Appalachian Section, Proceedings of the Annual Meeting, Roanoke, Virginia, February 1969.

7. Buongiorno, Joseph: Evaluation of Alternative Forest Regulation Methods, a Linear Programming Approach; Syracuse, New York, June 1969; x, 76 pages and Appendices.

8. Nelson, David H.: A Guide to Studies of the BLM's Role in the Western Oregon Economy; Syracuse, New York, June 1969; x, 118 pages and Appendices.

9. Teeguarden, D. E., J. A. Beck, Jr., and J. Buongiorno: A Computer Program for Evaluating Reforestation Investments; Berkeley, California, October 1969; 26 pages.

10. Cunningham, James P.: Road Simulation, A Subsystem for Land Management Decision Making; Syracuse, New York, June 1970; iv, 76 pages.

11. Dwyer, John F., and William A. Duerr: Research Needs and Priorities for BLM Forestry in Western Oregon; Portland, Oregon, June 1971, draft; ii, 59 pages.

12. Bell, Enoch Frye: Simulating a Silvicultural System; Syracuse, New York, June 1971; viii, 161 pages.

13. Haver, Gerald F.: Economic Guides to Road Location Alternatives on BLM Lands in Western Oregon; Syracuse, New York, June 1971; vi, 92 pages.

14. Duerr, W. A.: "Guides to Land Management," an Integrated Operations-Research Project with a Systems Viewpoint; in Forestry Commission Bul. 44, "Operational Research and the Managerial Economics of Forestry," edited by P. A. Wardle, London, 1971; pages 72-78.

15. Flick, Warren A.: Resource Valuation and Multiple-Use Planning, an Input-Output Approach; Syracuse, New York, December 1972; viii, 114 pages.

16. Buongiorno, Joseph, and D. E. Teeguarden: An Economic Model for Selecting Douglas-Fir Reforestation Projects. Hilgardia, June 1973.

BLM RESEARCH
PROGRESS REPORT 1973 F.Y.

I. Project Title and Contract No:

Reforestation in Southwest Oregon Study

Research Cont. No. 53500-CT3-3(N)

II. Contractor:

Pacific Northwest Forest and Range Experiment Station,
U. S. Forest Service

III. Project Location:

State - Southwestern Oregon

IV. Personnel:

BLM	1.	Service Center	K. Bergsvik
	2.	State Office	B. Mayer
Contractor:	1.	Project Leader	R. Romancier

V. Starting Date and Expected Completion Date:

July 1, 1972 - June 30, 1975 (tentative)

VI. Objective:

To improve the scientific basis for making harvesting and regeneration decisions in southwestern Oregon

VII. Progress:

Examination of all clearcuts that met selected criteria in the study area either in the field or on aerial photographs. Each adjacent stand was classified as to environment and its adjoining clearcut surveyed to determine success or failure of regeneration.

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Examination of all clearcuts that met selected criteria in the study area either in the field or on aerial photographs. Each adjacent stand was classified as to environment and its adjoining clearcut surveyed to determine success or failure of regeneration.

Multiple regression analyses were run to seek correlations of environmental factors with success of regeneration. Refer to progress report, "Harvest Cutting Prescriptions Based on An Environmental Classification in the S. Umpqua Basin, by R. E. Carkin and D. Mimore, Jan. 29, 1973 for details of study and results.

VIII. Plans for Next Fiscal Year:

To continue with the study plan as outlined in the Program Charter, Exhibit A, of the contract.

IX. Reports and Publications to Date:

1. Carkin, R. E. and Minore D., Harvest Cutting Prescriptions Based on An Environmental Classification in the South Umpqua Basin, Jan. 29, 1973.

BLM RESEARCH PROGRESS REPORT
FY 1973

I. Project Title: Problem Analysis - ORV's and the BLM

Contract Number: 53500-CT3-255(N)

II. Contractor: Utah State University

III. Project Location: Washington, Oregon, California, Arizona, New Mexico, Utah, Colorado, Wyoming, Idaho, and Montana

IV. Personnel:

BLM:	1. Service Center	Don Calhoun, COAR
Contractor:	1. Project Leader	Steve McCool, USU

V. Starting Date: March 20, 1973
Expected Completion Date: June 30, 1974

VI. Objective:

1. Identify the resource management agency problems associated with ORV's.

2. Prioritize identified problems for evaluation and research.

3. Identify research strategies for evaluating the problems and for developing policy and management solutions for their resolution.

4. Identify management strategies and administrative policies which presently exist that may have the capability of resolving off-road vehicle problems.

VII. Progress:

1. The USU-BLM national team has been selected.

2. The seminar format has been developed.

3. The seminar schedule has been determined.

4. Outside participants for the five seminars are currently being selected.

VIII. Plans for Next Fiscal Year:

1. Conduct the seminars.

2. Collate identified problems.

3. Prioritize identified problems.
4. Outline research strategies.
5. Prepare a report to BLM.

IX. Reports and Publications to Date: None.

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